Chelating Polymers for the Haemochromatosis Treatment

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Abstract

Haemochromatosis is a group of hereditary diseases which are characterised by toxic accumulation of iron in parenchymal organs, leading to organ toxicity and irreversible damage. Currently, there are only a few approved medications for this disease, yet all of them possess severe side effects.

Herein, we have proposed a new paradigm for treatment: insoluble polymers with negligible systemic biological availability would form stable complexes with iron ions in the gastrointestinal tract, hence decreasing biological availability of iron. The insolubility of polymers prevents them from being absorbed into the organism in the first place while having no systemic side effects or toxicity. We have prepared polymers with several covalently bound iron-chelating ligands and based on the biological data we selected the most successful chelators for possible future applications. These polymers exhibited negligible resorbability and toxicity, superior *in vitro* iron chelating activity and their efficacy was proven in an *in vivo* model. Therefore they could be used as a next-generation polymer therapeutics for haemochromatosis and/or other diseases of similar pathophysiology.

Key words: haemochromatosis; hemochromatosis, iron overload iron; iron metabolism; uptake inhibitor; iron uptake; chelator; polymer; polymer treatment; treatment; therapy